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ASSESING SLOPE INFLUENCE IN ARCSWAT MODELS OF ANDEAN WATERSHEDS

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This study develops the distributed watershed simulation model Soil and Water Assessment Tool (SWAT) to model run-off and sediments transport. It is applied to the Peruvian Jequetepeque basin, aimed at contributing to the local knowledge of the basin dynamics. Model is calibrated with data from 1998 to 2006. Influence of including terrain slope variation in SWAT spatial discretization is assessed, in both simulated run-off and calibrated parameters. Influence of mining in the upper part in land use is also assessed.

The Jequetepeque watershed (4372.5 km^2) is located in the north part of Peru. River flows into the Pacific Ocean, from east to west. Annual average precipitation ranges from 0 to 1100 mm, and altitude from 0 to 4188 masl. *Páramo* ecosystems are found in the upper part of the watershed. They may notably influence the hydrologic regime of the basin, being highly vulnerable to climate changes and anthropogenic activities. Variations of river slope are significant, i.e. 400 masl in roughly 80 km, with river slopes up to 20%.

Two different discretizations of the basin have been defined, with a different number of Hydrological Response Units (HRU). First one is based on sub-basin structure, land use and soil type. Second one also includes slope variation, thus increasing the number of HRU. Both cases have been automatically calibrated. Also influence of mining is assessed in HRU definition, and is included in both cases. The process includes following steps: parameter specification, parameter estimation and model evaluation. Parameter specification is performed through a sensitivity analysis, which is computed with the LH-OAT method, included in ArcSWAT2005. LH-OAT method combines Latin hypercube and One-Factor-a-Time sampling methods. Parameters are estimated using the sum of squared residuals (SSQ) as objective function, with an automatic optimization procedure, the Shuffled Complex Evolution Method (SCE). Finally, model is evaluated through comparison of hydrographs from daily run-off with measured data. The Nash-Sutcliffe Efficiency (NSE) coefficient, the Percent Bias (PBIAS) and the observations standard deviation ratio (RSR) are used to validate goodness of the adjustments.

Run-off results, values of calibrated parameters and computational effort of both discretizations are compared. Preliminary results show that SWAT can successfully be automatically calibrated with both coarse and fine spatial discretizations in large watersheds. Influence of slope in SWAT modeling has not been found justified, at least in run-off simulations. Results are consistent with experimental data in both cases, and both sets of calibrated parameters are credible. Sediment transport is expected to be more influenced by including slope in discretization criteria.